



Summary of Studies Supporting USDA Product Licensure

Establishment Name	Pharmgate Biologics, Inc.
USDA Vet Biologics Establishment Number	329
Product Code	49K5.R1
True Name	Porcine Circovirus Vaccine, Type 2, Killed Baculovirus Vector, Mycoplasma Hyopneumoniae Bacterin
Tradenname(s) / Distributor or Subsidiary (if different from manufacturer)	Circo/Mycogard - Pharmgate Biologics Inc. Pharmgate Biologics Inc.
Date of Compilation Summary	November 04, 2019

Disclaimer: Do not use the following studies to compare one product to another. Slight differences in study design and execution can render the comparisons meaningless.

Study Type	Efficacy												
Pertaining to	Circovirus, Porcine, Type 2 (PCV2)												
Study Purpose	Pivotal efficacy against porcine circovirus-associated disease												
Product Administration	One dose administered intramuscularly.												
Study Animals	Caesarian-derived, colostrum deprived pigs vaccinated at 12 days \pm 1 day of age and randomly divided into 20 vaccinates and 20 controls. 4 pigs served as sentinels.												
Challenge Description	All pigs were challenged 31 days after vaccination with two different strains of PCV2b												
Interval observed after challenge	Lymphoid tissues (iliac, mesenteric, tonsil, and tracheobronchial) were evaluated at 4 weeks (28 days) after challenge.												
Results	<p>Summary of PCV2 tissue colonization in lymphoid tissue.</p> <table border="1"> <thead> <tr> <th>Treatment Group</th> <th>PCV2 positive in lymphoid tissue</th> </tr> </thead> <tbody> <tr> <td>Vaccinates</td> <td>3/20</td> </tr> <tr> <td>Controls</td> <td>17/20</td> </tr> </tbody> </table> <p>Summary of lymphoid depletion observed in lymphoid tissue.</p> <table border="1"> <thead> <tr> <th>Treatment Group</th> <th>Lymphoid depletion</th> </tr> </thead> <tbody> <tr> <td>Vaccinates</td> <td>3/20</td> </tr> <tr> <td>Controls</td> <td>16/20</td> </tr> </tbody> </table> <p>No adverse events were reported in the 4 sentinel pigs.</p> <p>Raw data shown on attached pages.</p>	Treatment Group	PCV2 positive in lymphoid tissue	Vaccinates	3/20	Controls	17/20	Treatment Group	Lymphoid depletion	Vaccinates	3/20	Controls	16/20
Treatment Group	PCV2 positive in lymphoid tissue												
Vaccinates	3/20												
Controls	17/20												
Treatment Group	Lymphoid depletion												
Vaccinates	3/20												
Controls	16/20												
USDA Approval Date	12/17/2013												

Summary of Histological & Gross Pathological Diagnosis: Group 1

	Tonsil		MLN		ILN		TBLN		TOTALS		Gross Pathology and Remarks	Diagnosis
	IHC	LD	IHC	LD	IHC	LD	IHC	LD	IHC-total	LD-total		
2	1	1	1	1	0	0	0	1	2	3	No gross lesions	Normal
4	0	0	1	0	1	0	1	0	3	0	No gross lesions	Normal
6	0	0	0	0	1	1	0	0	1	1	Consolidation	Minor pneumoniae
7	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
10	0	1	2	1	1	1	1	0	4	3	Enteritis, rounded margins on liver see lymph node scores	Enteritis, lymph node hypertrophy
14	3	3	3	3	3	3	3	3	12	12	Poor body condition, found dead 28 days post-challenge	Presumptive PCV associated mortality
17	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
18	2	1	0	0	1	1	0	1	3	3	No gross lesions	Normal
33	1	0	0	1	1	2	1	2	3	5	Umbilical hernia, consolidation, enteritis, MLN congested, poor condition	Minor pneumoniae, enteritis present, poor condition suggestive of PCV infection
34	1	2	2	1	0	2	2	2	5	7	Poor body condition	Loss of body condition suggestive of PCV infection
37	1	1	1	2	1	2	1	1	4	6	Mottled discoloration	Very minor pneumoniae
41	0	0	0	0	0	0	1	1	1	1	See lymph node scores	mild lymph node hypertrophy
42	3	3	3	3	1	3	3	3	10	12	Poor body condition, icteric diffuse	generalized icterus typical of PCV infection
43	3	3	3	3	3	3	3	3	12	12	Found dead 14 days post-challenge, small areas of mottled discoloration in lungs, MLN nodes appear enlarged and congested, mild loss of body condition	Enteritis and mild pneumoniae present, gross lesion suggest enteritis and mild pneumonia. Tissues will be submitted to Iowa State University diagnostic lab
45	0	0	1	1	0	1	0	0	1	2	No gross lesions	Normal
47	2	2	1	1	0	2	1	2	4	7	Poor body condition, see lymph node scores	Lymph node hypertrophy, poor condition suggestive of PCV infection
48	2	2	3	3	2	3	2	3	9	11	Poor body condition, enteritis	Enteritis present
76	1	0	1	2	1	1	1	1	4	4	Mottled discoloration, poor condition	Minor pneumonia and poor condition suggestive of PCV infection
98	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
102	0	0	0	0	1	1	0	0	1	1	See lymph node scores	Lymph node hypertrophy

MLN: mesenteric lymph node

ILN: iliac lymph node

TBLN: tracheobronchial lymph node

IHC: Immunohistochemistry

LD: lymphoid depletion

Lymph Node Depletion Score:

0 = Negative

1 = Positive-mild

2 = Positive-moderate

3 = Positive-severe

Lymph Node IHC Score for tissue colonization:

0 = Negative

1 = Positive, <10% of cells with PCV2 staining

2 = Positive, 10-50% cells with PCV2 staining

3 = positive, >50% of cells with PCV2 staining

Summary of Histological & Gross Pathological Diagnosis: Group 2

ID	Tonsil		MLN		ILN		TBLN		TOTALS		Gross Pathology and Remarks	Diagnosis
	IHC	LD	IHC	LD	IHC	LD	IHC	LD	IHC-total	LD-total		
1	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
3	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
5	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
8	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
12	0	0	0	0	0	0	0	0	0	0	See lymph node scores	Mild lymph node hypertrophy
13	0	1	0	0	1	1	0	0	1	2	No gross lesions	Normal
15	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
16	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
35	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
36	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
38	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
39	0	0	0	0	1	1	1	1	2	2	No gross lesions	Normal
40	1	1	0	1	1	1	1	1	3	4	No gross lesions	Normal
44	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
46	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
82	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
101	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
103	0	0	0	0	0	0	0	0	0	0	See lymph node scores	Mild lymph node hypertrophy
104	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal
105	0	0	0	0	0	0	0	0	0	0	No gross lesions	Normal

MLN: mesenteric lymph node

ILN: iliac lymph node

TBLN: tracheobronchial lymph node

IHC: Immunohistochemistry

LD: lymphoid depletion

Lymph Node Deletion Score:

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Lymph Node IHC Score for tissue colonization:

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2 = Positive, 10-50% cells with PCV2 staining

3 = positive, >50% of cells with PCV2 staining

Study Type	Efficacy											
Pertaining to	<i>Mycoplasma hyopneumoniae</i>											
Study Purpose	Efficacy against respiratory disease											
Product Administration	One dose, given intramuscularly.											
Study Animals	Commercial pigs, 12 days \pm 1 day of age. 22 vaccinates and 21 controls.											
Challenge Description	All pigs were challenged 33 days after vaccination with <i>Mycoplasma hyopneumoniae</i> .											
Interval observed after challenge	Lungs evaluated 37 days after challenge for percent of the lung mass that was abnormal (consolidated).											
Results	<p>Summary of lung consolidation</p> <table border="1"> <thead> <tr> <th rowspan="2">Treatment Group</th> <th colspan="2">Lung consolidation</th> </tr> <tr> <th>0%</th> <th>\geq 0.50%</th> </tr> </thead> <tbody> <tr> <td>Vaccinates</td> <td>11/22</td> <td>9/22</td> </tr> <tr> <td>Controls</td> <td>2/20</td> <td>18/20</td> </tr> </tbody> </table> <p>1 pig in the control group died, unrelated to the study, prior to challenge.</p> <p>Raw data shown on attached page.</p>	Treatment Group	Lung consolidation		0%	\geq 0.50%	Vaccinates	11/22	9/22	Controls	2/20	18/20
Treatment Group	Lung consolidation											
	0%	\geq 0.50%										
Vaccinates	11/22	9/22										
Controls	2/20	18/20										
USDA Approval Date	12/17/2013											

Lung consolidation scores (%), in order of rank:

Vaccinate	Control
0	0
0	0
0	0.50
0	1.00
0	1.00
0	4.00
0	5.00
0	5.50
0	6.00
0	6.25
0	6.50
0.50	6.75
0.50	8.00
1.00	9.00
1.00	9.75
1.25	10.00
1.50	11.75
2.50	12.50
3.00	14.25
5.00	16.50
6.25	
15.50	

Study Type	Safety		
Pertaining to	ALL		
Study Purpose	Demonstrate safety of product under typical use conditions.		
Product Administration	1 dose administered by intramuscular route		
Study Animals	832 pigs ranging in age from 10 days to 3 weeks at each of 3 sites. All were vaccinated intramuscularly (IM). 1/3 of the pigs at each site were of minimum age recommended for product administration.		
Challenge Description	NA		
Interval observed after challenge	Animals were observed immediately following injection and then daily through 21 days after vaccination.		
Results		Frequency of adverse events (832 Total Pigs)	IM Injection
		Injection Site Swelling* (transient, ≤2 cm diameter)	2
		Respiratory Distress	0
		Pain on injection	0
		Pig Deaths (Affirmed by licensee to have cause other than vaccination)	9
		No adverse events	821
		*Injection site swelling resolved by Day 7 post-vaccination	
USDA Approval Date	06/21/2016		